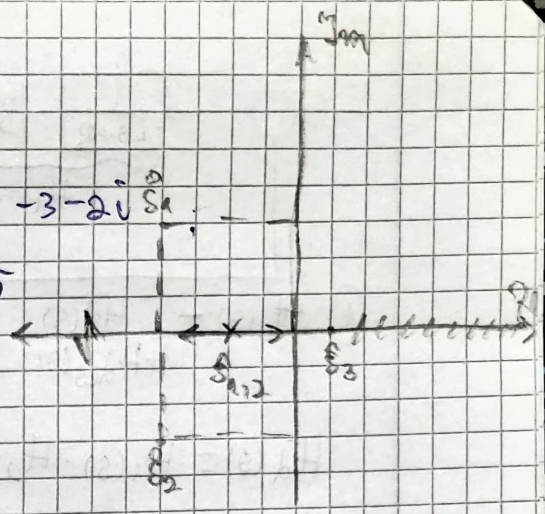
Fie: $H(s) = \frac{s^2+6s+13}{(s^2+2s+1)(s-0,5)}$

$m = 2$, $\overset{0}{s}_1 = -3+2i$, $\overset{0}{s}_2 = -3-2i$

$n = 3$, $\hat{s}_{1,2} = -1$, $\hat{s}_3 = 0,5$



$N = \max\{m,n\} = 3$

$e = n-m = 1$

$$\begin{cases} 1+K\cdot H(s)=0 \\ \frac{dH(s)}{ds}=0 \end{cases} \Rightarrow \frac{(2s+6)(s+1)^3(s-0,5)-(s^2+6s+13)(3s^2+3s)}{(s+1)^6(s-0,5)^2}$$

$$= \frac{(2s+6)(s+1)(s-0,5)-(s^2+6s+13)\cdot 3s}{(s+1)^3(s-0,5)^2} = 0$$

$$= \frac{(2s+6)(s^2+0.5s-0.5)-3s^3-18s^2-39s}{(s+1)^3(s-0,5)^2} = 0$$

$$= \frac{2s^3+s^2-s+6s^2+3s-3-3s^3-18s^2-39s}{(s+1)^3(s-0,5)^2} = 0$$

$$= \frac{-s^3-11s^2-37s-3}{(s+1)^3(s-0,5)^2} = 0 \Rightarrow s^3+11s^2+37s+3=0$$

$s_{01,02} = -5,4 \pm 2,5j$

$s_{03} = -0,08 \in RL$

$$1+K\cdot\frac{s^2+6s+13}{(s^2+2s+1)(s-0,5)} = 0$$

$$s^3-0.5s^2+2s^2-s+s-0.5+Ks^2-0,5+Ks^2+6Ks+13K=0$$

$$s^3+(1.5+K)s^2+6Ks+13K-0.5=0$$

$s = -0.08 \Rightarrow K = 0.039$

s^3	1	$6K$
s^2	$1.5+K$	$13K-0.5$
s^1	$\frac{6K^2-4K+0.5}{K+1.5}$	0
s^0	$13K-0.5$	0

$6K^2-4K+0.5=0$

$\Delta = 16-4\cdot 6\cdot 0,5 = 4 \Rightarrow K_{1,2} = \frac{4\pm 2}{12}$ $\begin{cases} K_1 = \frac{1}{2} \\ K_2 = \frac{1}{6} \end{cases}$

$K_1 = \frac{1}{2} \Rightarrow s = \pm\sqrt{3}j$; $K_2 = \frac{1}{6} \Rightarrow s = \pm j$

$\Phi_{s_{1,2}} = \angle(-1+3-2j) + \angle(-1+3+2j) - \angle(-1+1) - \angle(-1-0.5) - (2\ell+1)\pi =$

$= \angle(2-2j) + \angle(2+2j) - \angle(-1.5) - \pi =$

$= \operatorname{arctg}(-1) + \operatorname{arctg}(1) + \pi - \pi = -2\pi$

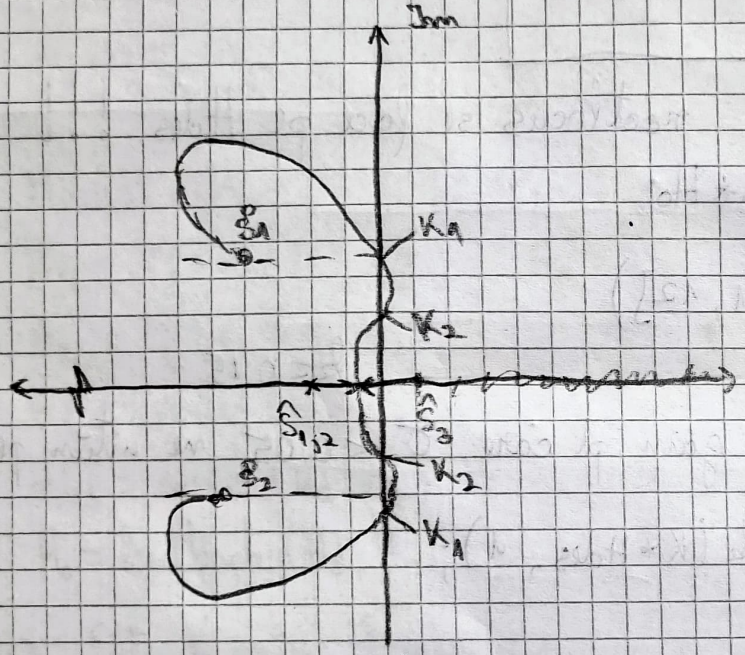
$$\varphi_{S_3} = \underline{|0.5+3-2j|} + \underline{|0.5+3+2j|} - \underline{|0.5+1|} - \underline{|0.5+1|} - (2l+1)\pi =$$

$$= \operatorname{arctg}\left(-\frac{2}{3.5}\right) + \operatorname{arctg}\left(\frac{2}{3.5}\right) - \pi = -\pi$$

$$\varphi_{S_1}^{0} = \underline{|-3-2j+1|} + \underline{|-3-2j+1|} + \underline{|-3-2j-0.5|} - \underline{|-3-2j+3-2j|} + \pi =$$

$$= 2\operatorname{arctg}(1) + \operatorname{arctg}\left(\frac{2}{3.5}\right) + \frac{\pi}{2} + \pi =$$

$$= 90^\circ + 29^\circ + 90^\circ + 180^\circ = 29^\circ$$



regimurile de funcționare:

$k \in (0, 0.039)$ - regim aperiodic neamortizat

$k = 0.039$ - regim aperiodic critic amortizat

$k \in (0.039, 0,16)$ - regim oscilant amortizat

$k = 0,16$ - reg. osc. întreținut

$k = (0,16, 0.5)$ - reg. osc. neamortizat

$k = 0,5$ - reg. osc. întreținut

$k \in (0,5, \infty)$ - reg. osc. amortizat